

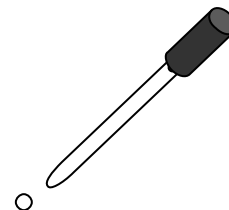
Name \_\_\_\_\_

## Evaporation and Cooling

*Can you explain a familiar sensation you might have felt at the Doctor's office?*

### A Drop of Alcohol

Take a drop of rubbing alcohol and put it on the back of your hand. Describe what your hand felt like when the alcohol evaporated.



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### Cooling by Evaporation Procedure

1. Put 50 ml of alcohol in a 250 ml beaker. Record the temperature of the alcohol on your data table. Dry the thermometer with a paper towel gently. (Do not wave the thermometer.)
2. Wrap the end of the thermometer with a little cotton gauze. Secure the gauze with a rubber band above the bulb of the thermometer. Record the temperature of the gauze on the table.
3. Use an eyedropper to dampen the gauze with rubbing alcohol. When it is moistened, record the temperature of the moistened gauze on your data table.
4. Wait three minutes, then read and record the temperature of the cotton again. Repeat your reading every 3 minutes for 15, or until the gauze is completely dry.

**Data Table**

Substance	Temperature (°C)
Initial reading of alcohol	
Initial reading of moistened gauze	
3 minute reading(drying gauze)	
6 minute reading	
9 minute reading	
12 minute reading	
15 minute reading	

5. Draw an inference from your data: How does alcohol evaporation affect the energy in the thermometer? Why do you think this?

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6. How did the effect change when evaporation stopped? \_\_\_\_\_

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7. Draw what is happening on a molecular level as the alcohol evaporates:



## Keeping Cool

Evaporation helps you dry your clothes, clears the sidewalk after a rain, and helps the steam clear off your glasses. But did you know you cannot live even a minute without it?

Like mammals, birds and even a few reptiles, you are a *homeotherm*. That means that your body is designed to work at a relatively constant temperature. Below about 36° Celsius you shiver and feel weak; above 38° Celsius you feel dizzy and ill. Some people say homeotherms are “warm blooded” but it’s not really good to be too warm, at all!

Your body’s processes are possible because of enzymes, complex proteins that catalyze chemical reactions. Enzymes work because of their shape; they cannot keep that shape if they are even a little too warm or cold. Keeping our body at the right temperature is the only way to keep its chemical factories operating efficiently.

Normal body processes generate heat. So every minute of every day your body’s cooling mechanisms—its physiological air conditioners—must work. The most important tool your body has to cool itself is evaporation. Call it perspiration or sweat: you cannot live without it.

It is easy to see how perspiration works on a hot day. Your skin gets damp, the water evaporates, and you feel better. You can even speed the process up with a splash of water on your face or a quick run through a sprinkler. But you perspire all the time, even on the coolest days. Every inch of your body perspires, all the time.

Think about that time you sat in a darkened theater, holding hands with someone else. Pretty soon your hand may have grown damp. Was it your nerves? No, it was just your normal, “insensible” perspiration that did not have the chance to evaporate.

Your skin is not the only organ that uses evaporation to cool you. Water passes through the cell membranes of your lungs, and into your bronchi. The steam in your breath has evaporated to help cool your body core.

Some animals sweat like people, but others cannot. The furry coats of dogs and the feathers of birds are such good insulators that they do not allow sweating to occur. But these animals must cool constantly, too. A dog relies almost entirely on evaporation from its lungs, panting to move that water vapor out of the body quickly.

So next time you decide to end your “perspiration problem” once and for all, with an expensive “antiperspirant,” think again. Your air conditioner is one of your body’s best appliances.

8. Can you think of any other processes that your body uses to maintain the appropriate temperature? \_\_\_\_\_
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